ARIZ 201c
September 1, 1993
(18 Pages)

SIEVING OF COARSE AND FINE GRADED SOILS AND AGGREGATES

(An Arizona Method)

SCOPE

1. (a) This procedure describes the method for sieving and determining the sieve analysis of fine and coarse graded soils and aggregates, including the determination of minus No. 200 material by elutriation.

(b) The procedure for sample preparation, sieving, and calculating the sieve analysis which is given in Sections 3 through 10 applies in general for all sieving operations. Section 11 gives a brief outline of the procedure for performing the sieve analysis when the sample is dried to constant weight prior to sieving. Section 12 gives an outline and description of the procedure for performing the sieve analysis when the sample is not dried to constant weight prior to sieving. Additional methods are given in Arizona Test Method 248, "Alternate Procedures for Sieving of Coarse and Fine Graded Soils and Aggregates".

(c) A washed gradation, utilizing an appropriate alternate procedure as described in either Alternate #1, 3, 4, or 5 of ARIZ 248, is to be used for all soil and aggregate materials with specification requirements for gradation. The washing requirement may be waived if the Engineer determines that it is unnecessary. However, in cases of dispute, the referee method shall be a washed gradation. Composited samples of mineral aggregate for bituminous mix designs shall be tested in accordance with either Alternate #3, 4, or 5 of ARIZ 248. If desired, the washed gradation of samples from individual stockpiles or bins may be determined and used in calculating the composite gradation.

(d) This test method may involve hazardous materials, operations, or equipment. This test method does not purport to address all of the safety problems associated with its use. It is the responsibility of whomever uses this test method to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

APPARATUS

2. The apparatus shall consist of the following:

(a) Sieves of sizes as required for screening, conforming to the requirements of AASHTO M 92.

(b) Any mechanical shaker may be used which produces the required thoroughness of sieving, as specified in paragraph 4(d).

(c) Balances or scales - Conforming to the requirements of AASHTO M 231, except when determining weights of 5000 grams or less, the readability and sensitivity shall be at least one gram; and when determining weights of greater than 5000 grams, the readability and sensitivity shall be at least 20 grams.

(d) Sample splitters - Shall conform to the requirements of, and be used in accordance with the procedures given in, AASHTO T 248.

(e) Heating/Drying Device - An oven or suitable heating device which is capable of drying samples without aggregate breakage or loss of material due to splattering. A micro-wave oven may be used to dry materials, provided proper attention is given to the use of apparatus and the intensity of heat generated.

(f) Brass wire brush for cleaning fine sieves coarser than No. 100, and a soft bristle brush for sieves No. 100 and No. 200.

(g) A suitable mechanical washing device with No. 200 mesh wire (Similar to Figure 1) for performing washing of fine soils and aggregates as described in Section 6, equipped with a metal tube(s) connected to a water and an air outlet; or a vessel of sufficient capacity and a nest of No. 16 and No. 200 sieves for use with the hand washing method. When utilizing mechanical washing equipment, the provision for air may be eliminated if the water pressure provides adequate agitation to wash sample as specified in Section 6.

(h) Miscellaneous pans, scoops, spatulas, brushes, pulverizing equipment, etc. for preparing, washing, and drying samples.

SAMPLE PREPARATION

3. (a) A representative sample of the amount indicated in paragraph (b) below shall be obtained. Dry the sample sufficiently to permit separation of particles on the No. 4 and larger sieves, and to develop a free-flowing condition in the portion passing the No. 4 sieve. The use of sunlight, ovens, fans, or warm air are the most common drying methods. Turn the sample frequently to prevent formation of hard clay lumps. If the sample contains hard clods or coated coarse aggregate particles, break up the clods by means which will not reduce the size of any rock. (The use of a rubber

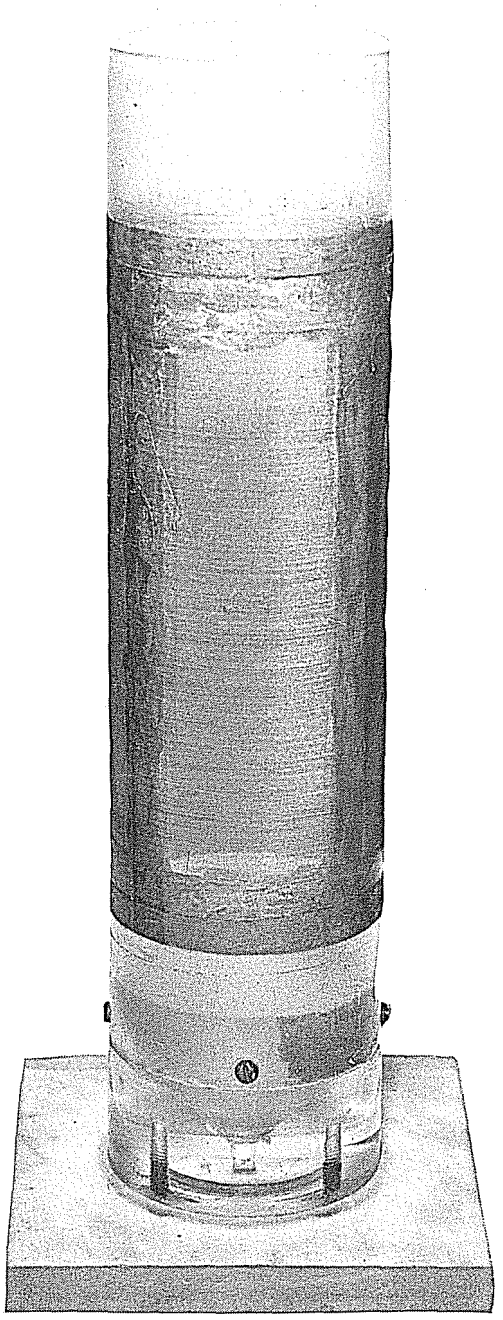

FIGURE 1

covered mallet or the raking of the material over an old screen have been found to be satisfactory methods.) When subsequent testing is to be performed on the material, it shall be assured that any temperature restrictions, as given in the appropriate test method(s), are not exceeded. A number of soil and aggregate tests, such as plasticity index, proctor maximum density, and sand equivalent, require that samples not be heated in excess of 140° F.

(b) If necessary, samples shall be reduced in size in accordance with the splitting or quartering methods in AASHTO T 248 to obtain the appropriate sample size as shown below.

Nominal Maximum Size of Particle*	Minimum Weight of Sample, grams (lbs.)
3/8"	1000 (2.2)
1/2"	2000 (4.4)
3/4"	5000 (11)
1"	10000 (22)
1-1/2"	15000 (33)
2"	20000 (44)
2-1/2"	25000 (55)
3"	30000 (66)
3" Slot	35000 (77)

* The smallest sieve opening through which the entire amount of material, by specification, is permitted to pass.

(c) If desired, the sample may be dried to constant weight. The sample may be considered to be at constant weight when, after an initial drying period of at least one hour, further drying causes less than 0.1% additional loss in weight within a five minute drying period. If desired, the material may be dried to constant weight utilizing a microwave oven in accordance with paragraph 2(e).

(d) Allow the sample to cool, if necessary, and record the weight of the material.

COARSE SIEVING

4. Normally the coarse sieving of material is performed utilizing the No. 4 sieve as the smallest sieve.

(a) When material being screened contains a large amount of passing No. 4 material, such that there may be overloading in the bottom pan during shaking operations, the sample shall be initially sieved over a No. 4 sieve to separate excess amounts of this material. This passing No. 4 material is saved and combined with the remaining portion of passing No. 4 material from subsequent coarse sieving. When material contains large rocks that are not to be sieved in the nest of coarse sieves during the actual shaking operation, the sample shall be pre-sieved to separate these particles. Unless all material will pass the largest sieve in the nested sieves, the material shall be pre-sieved over a sieve of the next larger size than that of the largest sieve size being utilized in the nested sieves. Large rocks separated in this manner are individually tested for passing the appropriate sieve, determining and recording the weight of any rock retained on these sieves.

(b) Empty the sample into the nest of sieves that is to be used for screening material. If pre-sieving has not been performed, remove any particles which may be retained on the top sieve and test these for passing the appropriate sieve, determining and recording the weight of any rock retained on these sieves.

(c) The material shall be subjected to sieving by hand or in a mechanical sieve shaker. The sieving action shall cause the particles to bounce and turn so as to present different orientations to the sieving surface. No particles shall be hand manipulated for passing any of the nested sieves. The sieving shall be of sufficient time to assure that the criteria for "thoroughness of sieving" described in paragraph (d) below is achieved.

(d) The criteria for "thoroughness of sieving" is that after completion of sieving, not more than 0.5 percent by weight of the total sample passes any sieve during one minute of continuous hand sieving in an 8 inch or 12 inch sieve as appropriate. If the thoroughness of sieving is being determined for sieves larger than 12 inches, the material retained on the respective sieve, or portions of that material shall be placed in a 12 inch sieve of the same sieve size opening, so as to not overload the sieve. Hold the individual sieve, provided with a snug fitting pan and cover, in a slightly inclined position in one hand. Strike the side of the sieve sharply and with an upward motion against the heel of the other hand at the rate of about 150 times per minute, turn the sieve about one-sixth of a revolution at intervals of about 25 strokes. A frequent check should be performed to assure that the thoroughness of sieving specified is being maintained in sieving operations.

(e) Overloading of sieves shall be avoided. The quantity of material on a given sieve at the completion of sieving shall not exceed the amount shown in the table below. As the weight retained on each individual sieve size is determined, it should be compared with the corresponding overloading criteria prior to combining the weighed

material. If overloading occurs, proper corrective action to regulate the amount of material on a sieve shall be taken. This may be accomplished by splitting the material which is retained on the overloaded sieve, resieving each portion, and combining weights.

Sieve Size	Maximum Weight Allowed (grams/ sq. in.)	Maximum Weight Allowed (grams)	
		12" Dia. Sieve	14-3/4" x 22-3/4" Sieve
3"	*	*	*
2-1/2"	*	*	*
2	*	*	*
1-1/2"	25	2827	8389
1"	18	2036	6040
3/4"	14	1583	4698
1/2"	10	1131	3356
3/8"	8	905	2685
1/4"	6	679	2013
#4	5	565	1678

* Normally particles of material retained on these sieves are tested individually, so no maximum weight allowed is specified.

(f) Starting with the largest of the nested sieves, the material retained on each sieve and in the bottom pan is weighed and recorded.

(g) Do not discard any of the sieved material until the sum of the individual weights is compared to the weight of sample prior to sieving. If the difference between the two weights is less than or equal to 1.0% of the weight of sample prior to sieving, an adjustment in weight shall be made on the sieve which has the largest weight retained, except no adjustments shall be made on the minus No. 4 material. If the difference is greater than 1.0%, the sample shall be recombined, resieved, and carefully reweighed.

SAMPLE FOR ELUTRIATION AND FINE SIEVING

5. (a) A representative minimum 500 gram sample of the passing No. 4 material from the coarse sieving shall be obtained by the use of a splitter in accordance with AASHTO T 248. The selection of an exact predetermined weight shall not be

attempted. The sample size may be reduced if the minimum of 500 grams is not obtained from coarse sieving, or if there is insufficient material for performing other desired tests utilizing the pass No. 4 material. When utilizing the mechanical washing device, the requirement for a minimum 500 gram sample may be reduced to a minimum of 200 grams for materials that tend to clog the No. 200 sieve (for example, fine soils such as blow sand, silty soils, or clay).

(b) The weight of the sample for elutriation and fine sieving is recorded to the nearest gram as "Dry Wt. Pass #4 Split".

(c) Subject the sample to elutriation by either mechanical washing (Section 6) or hand washing (Section 7).

MECHANICAL WASHING

6. This method is generally utilized for passing No. 4 material, although it may also be used with the alternate procedure described in Section 2 of Arizona Test Method 248 for testing materials containing small amounts of Plus No. 4 material (100% passing 3/8"). Generally, a maximum of 600 grams may be tested utilizing the mechanical washing device.

(a) Fill the washing device with water to the bottom of the windows. Transfer the sample to the washing device, and wash all material clinging to the sample container into the washing device. Utilizing the water tube, and air tube if necessary, agitate the sample vigorously enough so that it causes the material to go into suspension, but not enough to cause splattering to reach the top of the cylinder. Continue this washing action, taking care that there is no loss of sample by splattering or overflowing. (If the No. 200 sieve tends to plug excessively, this may be overcome to some extent by tapping the washing device with the palm of the hand or by washing down the inside of the sieve with a low stream of water.) Washing shall continue until the wash water becomes clear.

(b) Turn off the water and compressed air and remove the metal tube(s), rinsing clinging material back into the sample. Wash the sample into a container of sufficient capacity to hold the water and sample; allow the particles to settle and decant the excess water.

(c) Dry the sample to constant weight at a temperature that will not cause the material to be lost due to splattering.

(d) Allow the sample to cool, reweigh and record to the nearest gram as the fine sieve "Total Dry Weight".

(e) Subtract the "Total Dry Weight" from the "Dry Wt. of Pass No. 4 Split", and record as the "Elutriation".

HAND WASHING (REFEREE METHOD)

7. (a) Place the sample in a pan of sufficient size and capacity to allow washing without spillage. Cover with adequate water to thoroughly wash aggregate. Agitate the contents of the pan vigorously in order to completely separate all particles finer than the No. 200 sieve from the coarser particles, and to bring the finer material into suspension so that it will be removed by decantation of the water.

(b) Decant the wash water through a nest of No. 16 and No. 200 sieves.

(c) Repeat the washing and decanting cycle until the water becomes clear.

(d) Thoroughly wash all material remaining on the No. 16 and the No. 200 sieves and return to the sample.

(e) After the particles have settled in the pan, carefully decant any excess water, assuring that no particles are lost.

(f) Dry the sample to constant weight at a temperature that will not cause material to be lost due to splattering.

(g) Allow the sample to cool, reweigh and record to the nearest gram as the fine sieve "Total Dry Weight".

(h) Subtract the "Total Dry Weight" from the "Dry Wt. of Pass No. 4 Split", and record as the "Elutriation".

SIEVING OF FINE AGGREGATE

8. (a) Place the washed and dried fine aggregate sample into the top of the nested sieves, close the nest of sieves with lid.

(b) The material shall be subjected to sieving by hand or in a mechanical sieve shaker. The sieving action shall cause the particles to bounce and turn so as to

present different orientations to the sieving surface. No particles shall be hand manipulated for passing any of the nested sieves. The sieving shall be of sufficient time to assure that the criteria for "thoroughness of sieving" described in paragraph 4(d) is achieved.

(c) Overloading of sieves shall be avoided. The quantity of material on a given sieve at the completion of sieving shall not exceed 4 grams per square inch of sieving area (201 grams for an 8 inch diameter sieve and 452 grams for a 12 inch sieve). As the weight retained on each individual sieve size is determined, it should be compared with the corresponding overloading criteria prior to combining the weighed material. If overloading occurs, proper corrective action to regulate the amount of material on a sieve shall be taken. This may be accomplished by splitting the material which is retained on the overloaded sieve, resieving each portion, and combining weights.

(d) Starting with the largest of the nested sieves, the material retained on the individual sieves and in the bottom pan shall be weighed and recorded.

(e) Do not discard any of the sieved material until the sum of the individual weights is compared to the weight of sample prior to sieving. If the difference between the two weights is less than or equal to 1.0% of the weight of sample prior to sieving, an adjustment in weight shall be made on the sieve which has the largest weight retained, except no adjustments shall be made on the minus No. 200 material. If the difference is greater than 1.0% the sample shall be recombined, resieved, and carefully reweighed.

PRECAUTIONS

9. (a) Check sieves at least daily for broken or distorted wire, and replace any sieves found to be damaged or excessively worn.

(b) Sieves not conforming to AASHTO M 92 must be replaced.

(c) Do not repair wire cloth.

(d) Clean sieves carefully after each shaking, using the proper instrument to reduce chances of damaging the mesh.

(e) All mechanical equipment shall be inspected frequently and maintained by greasing, cleaning, and repair of worn out parts.

CALCULATIONS

10. The calculations for determining the sieve analysis are as follows. Examples of these calculations are given in Figures 2 and 3.

(a) The calculations to determine the % passing values for the coarse sieve anaylsis are performed as described below:

1) For the largest sieve which has no material retained, record the percent passing as 100. Determine a factor for calculating the coarse sieve analysis by the following. Record the coarse sieve factor to at least six decimal places.

$$\text{Coarse Sieve Factor} = \frac{100}{\text{Coarse Sieve Total}}$$

2) The percent passing for each sieve in the coarse sieve analysis is determined by multiplying the weight retained on that sieve times the coarse sieve factor, and subtracting the result from the unrounded % passing for the next larger sieve, as shown below. Values for "weight retained times the coarse sieve factor" and "percent passing each sieve" shall be determined and used in the calculations to at least six decimal places. The percent passing value for each sieve is recorded in the sieve analysis to the nearest whole percent.

$$\text{Percent Passing Desired Sieve} = \left[\text{Unrounded \% Pass for next larger sieve}\right] - \left[\text{Weight Retained on Desired Sieve} \times \text{Coarse Factor}\right]$$

3) As a check on the coarse sieve analysis, multiply the weight of minus No. 4 material times the coarse sieve factor, as shown below. The result of this calculation, rounded to the nearest whole percent, should be the same as the value for percent passing the No. 4 sieve determined in the paragraph above.

$$\text{Check for Percent Passing No. 4} = \left[\text{Wt. of Pass No. 4} \times \text{Coarse Factor}\right]$$

(b) The calculations to determine the % passing values for the fine sieve analysis are performed as described below:

1) Determine a factor for the fine sieve analysis by dividing the percent passing the No. 4 sieve (which has been recorded to the nearest whole percent) by the "Dry Weight of Pass #4 Split", as shown below. Record the fine sieve factor to at least six decimal places. If all the pass No. 4 material from coarse sieving was subjected to elutriation and fine sieving, a fine sieve factor is not determined. Rather, the coarse sieve factor is utilized and the calculation of the percent passing each sieve is continuous through the entire sieve analysis.

$$\text{Fine Sieve Factor} = \frac{\text{Rounded Percent Pass No. 4}}{\text{Dry Wt. of Pass No. 4 Split}}$$

2) The percent passing for each sieve in the fine sieve analysis is determined by multiplying the weight retained on that sieve times the fine sieve factor, and subtracting the result from the unrounded % passing the next larger sieve, with the exception of the percent passing the No. 4 which has previously been recorded to the nearest whole percent. The equation for determining the percent passing each sieve is shown below. Values for "weight retained times the fine sieve factor" and "percent passing each sieve" shall be determined and used in the calculations to at least six decimal places. The percent passing value for each sieve is recorded in the sieve analysis to the nearest whole percent, except the percent passing the No. 200 sieve is recorded to the nearest 0.1 percent.

$$\text{Percent Passing Desired Sieve} = \left[\text{Unrounded \% Pass for next larger sieve}\right] - \left[\text{Weight Retained on Desired Sieve} \times \text{Fine Factor}\right]$$

3) As a check on the fine sieve analysis, the weight of material passing the No. 200 from sieving is added to the elutriation weight, and this total is multiplied times the fine sieve factor, as shown below. The result of this calculation, rounded to the nearest 0.1 percent, should be the same as the value for the percent passing the No. 200 determined in the paragraph above.

$$\text{Check for percent Passing No. 200} = \left[\text{Wt. of Passing No. 200} + \text{Elutriation Weight}\right] \times \text{Fine Factor}$$

(c) If desired, obtain the percent retained on each sieve by subtracting the rounded % passing value for that sieve from the rounded % passing value for the next larger sieve, as shown below.

$$\text{\% Retained for Desired Sieve} = \left[\text{Rounded \% Pass Next Larger Sieve} - \text{Rounded \% Pass the Desired Sieve}\right]$$

(d) Other methods may be used that differ from that specified in paragraphs (a) and (b) above to determine % passing each sieve, so long as the method utilized has been proven to give equivalent results. However, any procedure which includes recording percent retained values prior to completing the calculation of all percent passing values is not allowed.

PROCEDURE WHEN SAMPLE IS DRIED TO CONSTANT WEIGHT PRIOR TO SIEVING

11. The following is a brief outline of the procedure to be used when the sample is dried to constant weight prior to sieving. An example of this procedure is shown in Figure 2.

(a) Prepare sample, dry to constant weight, allow to cool, and record as "Coarse Sieve Total", (3087 in the example).

(b) Perform coarse sieving.

(c) Record the weight of the material in the appropriate "Weights Retained" box for each sieve and the pan.

(d) Sum the individual weights retained for each sieve, compare to the weight of sample prior to sieving (Coarse Sieve Total), and adjust or resieve as necessary.

(e) Split the pass No. 4 material to at least 500 grams and record as "Dry Wt. of Pass No. 4 Split", (533).

(f) Perform elutriation on the dry - #4 split, dry back to constant weight, allow to cool, and record as the "Total Dry Weight", (491).

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

LAB NUMBER	PROJ CODE	ORG NUMBER	MATL	TYPE	PURPOSE	TEST LAB	SIZE	SIZE %
93-6666	7777	8888	MA	12	A	P	-	+

TEST NO.	LOT OR SUFFIX	SAMPLED BY	MO	DAY	YEAR	TIME
17	+	A. JONES	11	16	93	9:25 ☒ AM ☐ PM

SAMPLED FROM: COLO FEED
LIFT NO.: + RDWY: + STATION: + PLUS (IF MILEPOST, INPUT DECIMAL)

ORIGINAL SOURCE	PROJECT ENGINEER / SUPERVISOR	PROJECT NUMBER	TRACS NUMBER
PIT #4444	B. SMITH	F-099-9(99)	H999901C

REMARKS: EXAMPLE FOR PROCEDURE WHEN SAMPLE IS DRIED TO CONSTANT WEIGHT PRIOR TO SIEVING-(SECTION 11).

ARIZ 201

% OVERSIZE: +3" ☐ +6" ☐ COARSE FACTOR: 032394

WET SAMPLE PREWEIGHT = —
WET WT. OF -#4 = —
-#4 SPLIT WET WT. = —

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	CUMULATIVE % RET. FINENESS MODULUS
3" ☐					
2 1/2"					
2"					
1 1/2"					
1"					
3/4"	0		100	100	
1/2"	92	3	97	89-100	
3/8"	568	18	79	70-87	
1/4"	354	12	67		
#4	401	13			
-#4	1672	✓	54		
Total	3087				

IF TOTAL SAMPLE IS WASHED:
UNWASHED WT. = —
WASHED WT. = —
ELUTRIATION = —

DRY WT. OF -#4 SPLIT: 533 FINE FACTOR: 101313

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	
#8	89	9	45	40-57	
#10	56	6	39		
#16	103	10	29		
#30	68	7	22		
#40	40	4	18	13-23	
#50	45	5	13		
#100	51	5	8		
#200	37	4			
-#200	2	✓	4.5	2.4-6.0	
Total	491				
Elutriation	42				

Dry Weight

T = AASHTO Tests

		SPECS.
Liquid Limit (LL)	T - 89	
Plastic Limit (PL)	T - 90	
Plasticity Index (PI) = LL - PL	T - 90	
Abrasion Method (A,B,C,D)	T - 96	
@ 100 Revolutions	%	%
@ 500 Revolutions	%	%
Absorption, H_2O	T - 85 ARIZ 211 %	
Specific Gravity, SSD	T - 85 ARIZ 211 *	
Specific Gravity, OD	T - 85 ARIZ 211 *	
Proctor Method		A - ARIZ 225 C - ARIZ 226 D - ARIZ 226 AD - ARIZ 245 AI - ARIZ 232 ADI - ARIZ 246
Optimum Moisture	* %	
Max. Dry Density	* PCF	
Sand Equivalent	T - 176 ARIZ 242 (MAFC)	
Fractured Faces Weight (Wf)		
Total Sample Weight (Wa)		
Fractured Faces (FF) = $\frac{Wf}{Wa}$ x 100	ARIZ 212 %	%
Wet Weight (W)	* g	
Dry Weight (D)	* g	
Moisture Content = $\frac{W-D}{D}$ x 100	T - 255 T - 265 * %	
Flakiness Index	ARIZ 233 %	%
Carbonates	ARIZ 238 %	%
pH	ARIZ 236 OR 237	
Resistivity (ohm-cm)	ARIZ 236	
Soluble Salts (PPM)	ARIZ 237	

FINENESS MODULUS = TOTAL CUMULATIVE % RET. / 100

WHITE ☒ YELLOW ☐ BLUE ☐

11-16-93 RECEIVED DATE
Joe Dagood 11-16-93 TEST OPERATOR & DATE
Ted Headman 11-16-93 SUPERVISOR & DATE

44-6083 R9/93

FIGURE 2

(g) Determine and record "Elutriation" by subtracting the "Total Dry Weight" from the "Dry Wt. of Pass No. 4 Split", (533 - 491 = 42).

(h) Perform fine sieving on the material left from elutriation using the No. 8 sieve down to the No. 200.

(i) Record the weight of material in the appropriate "Weights Retained" box for each sieve.

(j) Sum the individual weights retained for each sieve, compare to the weight of sample prior to sieving (fine sieve Total Dry Weight), and adjust or resieve as needed.

(k) Determine the sieve analysis of the material as described in Section 10.

PROCEDURE WHEN SAMPLE IS NOT DRIED TO CONSTANT WEIGHT PRIOR TO SIEVING

12. The following is an outline and description of the procedure to be used when the sample is not dried to constant weight prior to sieving. An example of this procedure is shown in Figure 3.

(a) Prepare sample, dry to free flowing condition, and record this weight as "Wet Sample Preweight", (13010 in the example).

(b) Perform coarse sieving.

(c) Record the weight of the material in the appropriate "Weights Retained" box for each sieve, except record the weight of pass No. 4 material as the "Wet Wt. of - #4", (7365).

(d) Sum the individual weights retained for each sieve, compare to weight of sample prior to sieving (Wet Sample Preweight), and adjust or resieve as needed.

(e) The wet weight of pass No. 4 material is corrected for moisture using either a split of, or the entire amount of, the pass No. 4 material.

(f) If a split of the pass No. 4 material is to be used to correct the weight of pass No. 4 material for moisture, immediately split the passing No. 4 material to at least 500 grams and record as the "- #4 Split Wet Wt.", (506). Dry the sample to constant

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

LAB NUMBER	PROJ CODE	ORG NUMBER	MATL	TYPE	PURPOSE	TEST LAB	SIZE	SIZE %
93-4444	7777	8888	AB	2	A	P	-	+

TEST NO.	LOT OR SUFFIX	SAMPLED BY	MO	DAY	YEAR	TIME
9	+	A. JONES	10	13	93	2:35 ☐ AM ☒ PM

SAMPLED FROM	LIFT NO.	RDWY	STATION	PLUS
WINDROW	1	NB	980+50	IF MILEPOST, INPUT DECIMAL

ORIGINAL SOURCE	PROJECT ENGINEER / SUPERVISOR	PROJECT NUMBER	TRACS NUMBER
PIT # 3333	B. SMITH	F-099-9(99)	H999901C

REMARKS
EXAMPLE FOR PROCEDURE WHEN SAMPLE IS NOT DRIED TO CONSTANT WEIGHT PRIOR TO SIEVING - (SECTION 12).

ARIZ 201

% OVERSIZE: +3" ☐ ____ +6" ☐ ____ COARSE FACTOR 007765

WET SAMPLE PREWEIGHT = 13010
WET WT. OF -#4 = 7365
-#4 SPLIT WET WT. = 506

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	CUMULATIVE % RET. FINENESS MODULUS
3" ☐					
2 1/2"					
2"					
1 1/2"	0		100	100	
1"	910	7	93	90-100	
3/4"	1455	11	82		
1/2"	645	5	77		
3/8"	1745	14	63		
1/4"	515	4	59		
#4	385	3			
-#4	7234	✓	56		
Total	12879				

IF TOTAL SAMPLE IS WASHED:
UNWASHED WT. = -
WASHED WT. = -
ELUTRIATION = -

DRY WT. OF -#4 SPLIT 497
FINE FACTOR 112676

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	
#8	42	5	51	35-55	
#10	76	8	43		
#16	34	4	39		
#30	54	6	33		
#40	103	12	21		
#50	44	5	16		
#100	46	5	11		
#200	39	4			
-#200	2	✓	6.6	0-8.0	
Total	440	Dry Weight			
Evolution	57				

T = AASHTO Tests

		SPECS.
Liquid Limit (LL)	T - 89	
Plastic Limit (PL)	T - 90	
Plasticity Index (PI) = LL - PL	T - 90	
Abrasion Method (A,B,C,D)	T - 96	
@ 100 Revolutions	%	%
@ 500 Revolutions	%	%
Absorption, H_2O	T - 85 ARIZ 211 %	
Specific Gravity, SSD	T - 85 ARIZ 211	
Specific Gravity, OD	T - 85 ARIZ 211	
Proctor Method		A - ARIZ 225 C - ARIZ 226 D - ARIZ 226 AD - ARIZ 245 AI - ARIZ 232 ADI - ARIZ 246
Optimum Moisture	%	
Max. Dry Density	PCF	
Sand Equivalent	T - 176 ARIZ 242 (MAFC)	
Fractured Faces Weight (Wf)		
Total Sample Weight (Wa)		
Fractured Faces (FF) = $\frac{Wf}{Wa}$ x 100	ARIZ 212 %	%
Wet Weight (W)	g	
Dry Weight (D)	g	
Moisture Content = $\frac{W-D}{D}$ x 100	T - 255 T - 265 %	
Flakiness Index	ARIZ 233 %	%
Carbonates	ARIZ 238 %	%
pH	ARIZ 236 OR 237	
Resistivity (ohm-cm)	ARIZ 236	
Soluble Salts (PPM)	ARIZ 237	

FINENESS MODULUS = $\frac{\text{TOTAL CUMULATIVE \% RET.}}{100}$

WHITE ☒
YELLOW ☐
BLUE ☐

10-13-93 RECEIVED DATE
Joe Dolood 10-14-93 TEST OPERATOR & DATE
Ted Headman 10-14-93 SUPERVISOR & DATE

44-0353 R8/93

FIGURE 3

weight, allow to cool, and record the weight as "Dry Wt. of Pass #4 Split", (497). If an elutriation and fine sieve analysis is to be performed, this split is used for that testing. Determine and record the "weight of pass No. 4 material" (7234) by the following:

$$\text{Weight of Pass No. 4 Material} = \left[\text{Wet Wt. of - \#4}\right] \times \left[\frac{\text{Dry Wt. of Pass No. 4 Split}}{\text{- \#4 Split Wet Wt.}}\right]$$

(g) If the entire amount of the pass No. 4 material is to be used to correct the weight of pass No. 4 material for moisture, the material is dried to constant weight and allowed to cool. The dry weight is recorded as the "weight of pass No. 4 material". If an elutriation and fine sieve analysis is to be performed on this material, the dry weight is also recorded as the "Dry Wt. of Pass No. 4 Split".

(h) Determine and record the sample "Coarse Sieve Total" (12879) by the following:

$$\text{Coarse Sieve Total} = \left[\text{Wet Sample Preweight}\right] - \left[\text{Wet Wt. of - \#4} - \text{Weight of Pass No. 4 Material}\right]$$

(i) If required, perform elutriation on the dry - #4 split, dry back to constant weight, allow to cool, and record as the "Total Dry Weight", (440).

(j) Determine and record "Elutriation" by subtracting the "Total Dry Weight" from the "Dry Wt. of Pass No. 4 Split", (497 - 440 = 57).

(k) Perform fine sieving on the material left from elutriation using the No. 8 sieve down to the No. 200.

(l) Record the weight of material in the appropriate "Weights Retained" box for each sieve.

(m) Sum the individual weights retained for each sieve, compare to the weight of sample prior to sieving (fine sieve Total Dry Weight), and adjust or resieve as needed.

(n) Determine the sieve analysis of the material as described in Section 10.

REPORT

13. (a) The sieve analysis shall be reported either as shown in the example given in Figure 2 for a sample which has been dried to constant weight prior to sieving, or as shown in the example given in Figure 3 for a sample which has not been dried to constant weight prior to sieving.

(b) A blank Soils and Aggregate Tabulation laboratory card is provided in Figure 4.

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

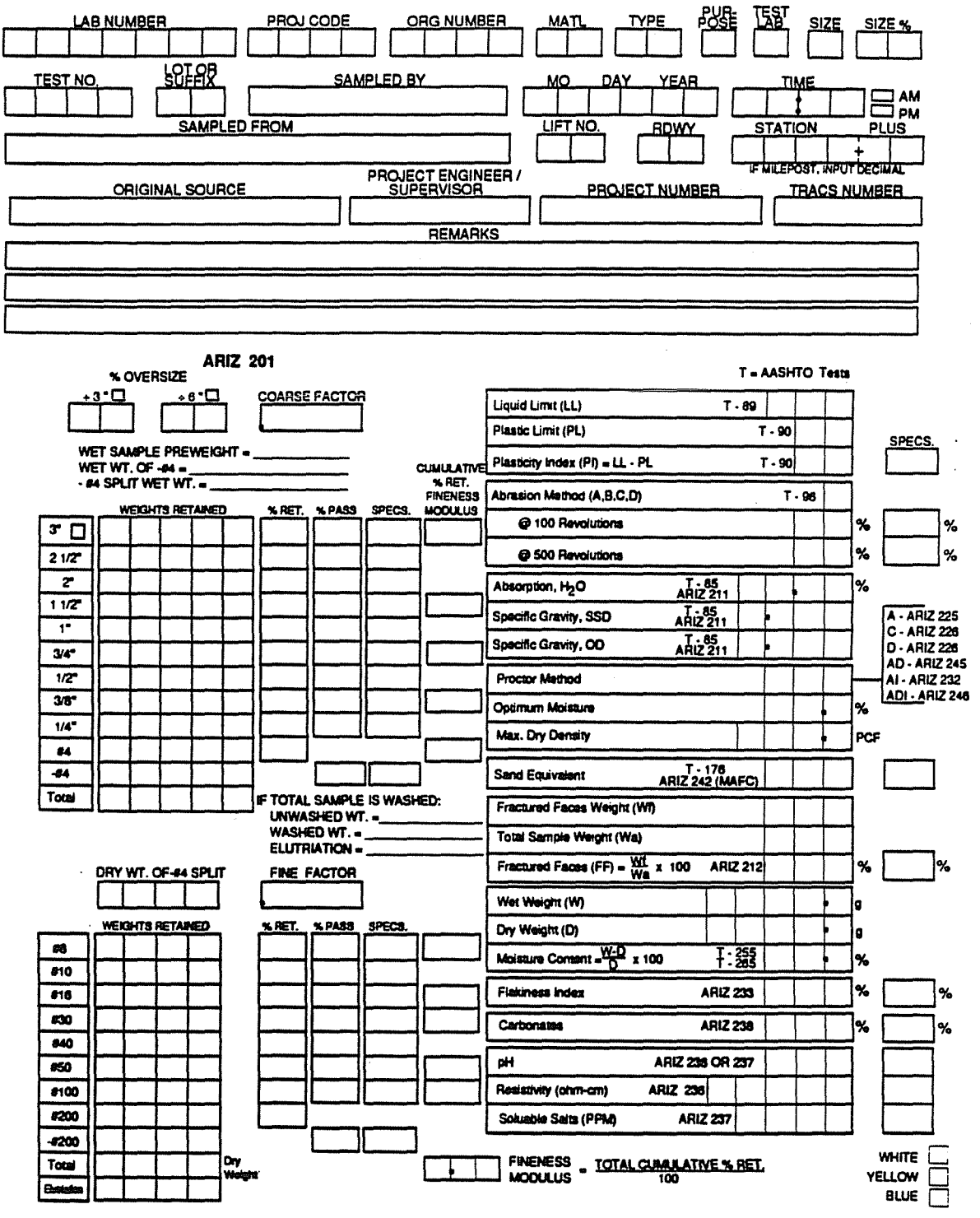

FIGURE 4